Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

Reserve
A 281.9
Ag 83

U. S. DEPT. OF AGRICULTURE
NATIONAL AGRICULTURAL LIBRARY
APR 19 1965
CURRENT SERIAL RECORDS

SELECTED AGRICULTURAL PRODUCTS IN India

U.S. DEPARTMENT OF AGRICULTURE/FOREIGN REGIONAL ANALYSIS DIVISION
ECONOMIC RESEARCH SERVICE/ERS-FOREIGN-100

PREFACE

The U. S. Department of Agriculture in 1959 contracted with the National Council of Applied Economic Research, New Delhi, India (Dr. P. S. Lokanathan, Director-General), to prepare a projection of the supply of, and demand for, selected agricultural products of India. The research constitutes a part of the Department's efforts to evaluate the long-term prospects for agricultural products throughout the world.

Results of the study were published in India in an unabridged version in March 1962 by the National Council of Applied Economic Research (NCAER) under the title: "Long-term Projections of Demand for and Supply of Selected Agricultural Commodities, 1960/61 to 1975/76".

Professor John W. Mellor, under a cooperative agreement between the U. S. Department of Agriculture and Cornell University, undertook a critical analysis of the findings presented in the NCAER publication. The Mellor study "Review and Analysis of the National Council of Applied Economic Research Study of Long-term Projections of Demand for and Supply of Agricultural Commodities, 1960/61 to 1975/76" was completed and made available to USDA in July 1963.

The report herein summarizes the report of the National Council, and analyzes its findings on the basis of the Mellor study. Progress under India's Third Five Year Plan and developments in the country's economy that have occurred in the more than 2 years that have elapsed since the Indian study was published are also considered. Some overall conclusions regarding the prospective future supply of and demand for selected agricultural commodities, and their implications for U. S. agriculture, are given.

This report was published in Israel with Public Law 480 (104a) local currency funds made available through the Foreign Agricultural Service, U. S. Department of Agriculture

Published for the U. S. Department of Agriculture, Economic Research Service
by the Israel Program for Scientific Translations
Printed in Jerusalem by S. Monson

CONTENTS

	Page
Summary	v
Introduction	1
The NCAER Study	2
Methodology	2
Demand Projections	5
Supply Projections	7
Alternative Projections	9
Evaluation of the NCAER Study	13
Response Coefficients	13
Supply and Demand	14
Evaluation of the NCAER Study (cont.)	
Inputs Affecting Production	15
Conclusions	17
Third Five Year Plan	17
Background	17
Third Plan Targets	18
Mid-term Appraisal	18
Conclusions and Implications	20
Food grains	21
Other commodities	23

TABLES

		Page
1.	India: Projected annual per capita demand for selected commodities to 1975/76, with 1960/61 comparison	6
2.	India: Projected annual aggregate demand for selected commodities to 1975/76, with 1960/61 comparison	7
3.	India: Projected production of selected crops to 1975/76, with 1960/61 comparison	8
4.	India: NCAER alternative projections to 1975/76 of demand for selected commodities, with 1960/61 comparison	10
5.	India: NCAER alternative projections to 1975/76 of production of selected commodities, with 1960/61 comparison	11
6.	India: NCAER alternative projection to 1975/76 of import demand (-) for or export surplus (+) of selected commodities with 1960/61 comparison	12
7.	India: Alternative projections of total food grain production to 1975/76, with 1960/61 comparison	16
8.	India: Third Five Year Plan production targets for selected commodities, with comparisons, 1965/66	18
9.	India: Projected gross imports of selected agricultural commodities, 1965/66, 1970/71, and 1975/76	21
10.	India: Principal food grain imports, by country of origin, 1951-62	22
11.	India: Foreign trade in cotton, by countries of origin and destination, 1951-62	24
12.	India: Vegetable oil exports, by country of destination, 1951-62	25
13.	India: Tobacco exports by country of destination, 1951-62	26

SUMMARY

Agricultural production in India has not increased since 1960/61. Thus it seems unlikely that the production targets of the Third Five Year Plan will be met. Even the somewhat lower levels of production and demand projected in the study by the National Council of Applied Economic Research seem too high. It now seems that a more recent projection made by John W. Mellor of Cornell University may be closer to India's actual achievement than projections of the Council. Professor Mellor's projection of India's food grain production for 1975-76 was 111 million metric tons, the Council's 142 million metric tons.

India's steadily growing population coupled with a moderate increase in per capita income is expected to result in a rising need for imported food grains; principally wheat, but also rice. If India can obtain foreign produced food grains on sufficiently liberal terms such as those provided in Public Law 480, then actual 1975/76 imports might be in the neighborhood of 6 to 7 million metric tons. The United States probably would be the principal supplier.

Cotton consumption in India by 1975/76 is anticipated to total roughly about 8 million bales. An Indian bale weighs 392 pounds net. Gross imports in 1975/76 may approximate a half million bales of the grades and staple lengths normally exported by the United States. Competition will be keen for this market.

Oilseed production is expected to increase at a rate roughly equal to the anticipated rise in total consumption. India probably will be a small net importer in most years to 1975/76. However, for the foreseeable future, it appears unlikely that there will be a significant sustained demand from India for U.S. fats and oils. Indian vegetable oils may possibly, from time to time, offer limited competition to U.S. vegetable oils in world markets.

India's tobacco production is expected to increase at a sufficiently rapid rate to take care of an expected rise in total consumption and permit the country to maintain its export position. Little change in annual imports of a few thousand tons of top quality U.S. flue-cured leaf is expected, especially if U.S. tobacco continues to be available on concessional terms.

INDIA — PROJECTIONS TO 1975/76 OF SUPPLY OF AND DEMAND FOR SELECTED AGRICULTURAL PRODUCTS

by
Clarence E. Pike, Chief
Far East Branch, Foreign Regional Analysis Division
Economic Research Service

INTRODUCTION

India, the world's second most populous country, is a leading producer, exporter, importer, and consumer of farm products. An overwhelming dependence on agriculture as a means of livelihood has been a characteristic feature of the Indian economy with nearly 80 percent of the people living in rural areas. Nevertheless, the country has been unable to grow enough food to feed its people. Over the past decade food grain imports, largely wheat but also rice, have amounted to from 2 to 5 million metric tons in most years. Most food grain imports have been supplied by the United States, largely under Public Law 480. In addition the United States supplies substantial amounts of cotton and tobacco leaf to India. Leading Indian farm exports — tea, jute products, cashew nuts, and spices — usually do not compete with U.S. exports. However, a few items, notably tobacco and vegetable oils, are somewhat competitive.

The Indian economy is operating under a system of planning in which the Government largely determines the level and pattern of investment and assigns priorities for the fulfillment of the plan targets. India is now in the midst of its Third Five Year Plan (fiscal year 1961/62 through 1965/66). The goals of the current Plan call for virtual self-sufficiency in farm products by 1965/66 coupled with increasing availabilities for export of cotton, tobacco, vegetable oils, and other farm commodities. The Third Five Year Plan, it has been officially stated, represents the first phase in a scheme of long-term development extending over 15 years or longer. The degree of success India achieves in attaining its agricultural production goals is expected to affect significantly the long-term demand for the U.S. farm products which India has been importing in large volume. Hence, the importance of including India among the countries to be studied in the overall USDA plan to project the long-term foreign demand for U.S. farm products. Also important to U.S. foreign trade is the future export availability of Indian farm products that compete with U.S. products in world trade.

THE NCAER STUDY

This section is a summary of a March 1962 report entitled "Long-term Projections of Demand for and Supply of Selected Agricultural Commodities, 1960/61 to 1975/76" published by the National Council of Applied Economic Research, New Delhi, India. Much of this section is paraphrased from the NCAER report.

The National Council of Applied Economic Research, under a contract with the U.S. Department of Agriculture, began in 1959 a study of the long-term supply of and demand for selected agricultural commodities in India over the period 1960/61 to 1975/76. This period corresponds to India's Third (1960/61-64/65), Fourth (1965/66-69/70), and Fifth (1970/71-75/76) Five Year Plans of economic development.

The specific commodities chosen for the study were food grains, cotton, oilseeds, and tobacco. These account for over 90 percent of the area under cultivation in India. The project was designed to arrive at probable magnitudes of demand for the commodities specified, the extent of their supply through domestic production, and the likely order of export surpluses or import deficits.

The NCAER points out that the implications of this study should be properly interpreted. There are several limitations to studies that deal with long-term economic projections. Long-term projections which are concerned with economic magnitudes are inevitably based on assumptions of quite a wide range, which may or may not hold true for the projected period. Assumptions about consumer behavior, changes in tastes and shifts in preference patterns, may turn out to be deceptive in a society undergoing rapid changes. Nature, which plays an important role in determining the level of production, does not lend itself to quantitative measurement in terms of gains and losses. Finally, it is imperative to recognize the deficiencies of the available statistical data, published or otherwise, used in this study. Incomplete coverage of different regions, non-comparability over time, changes in the method of data collection, lapses in presentation of the data collected, etc., are some of the shortcomings of agricultural statistics in India. In spite of these limitations, however, the projections do permit broad conclusions to be drawn on the relative size of the demand and supply of the selected agricultural commodities over the projected period.

Methodology

The technique of projections adopted in this study is based upon certain assumptions regarding the structure of the economy, the pattern of supply and demand relationships, and other economic and non-economic factors. It assumes the absence of exogenous disturbances. It also necessitates assumptions in regard to the likely changes in the direction and magnitude of the parameters, and the determining variables in the system of economic relationships postulated for purposes of projections.

Demand — The projections of demand are based on a set of assumptions regarding the factors that influence demand such as per capita incomes, relative price changes, and growth of population. They also assume that during the entire period of projections consumer tastes and preferences as well as price and income elasticities for the commodities under study will remain constant. Thus, the growth of demand for food grains,

edible oils, cotton clothing, and tobacco is envisaged as depending primarily on the expected rate of increase in real per capita income and population. The differences inherent in the rural and urban consumption habits are assessed by projecting demand separately for the 2 sectors.

The most important source of information on consumer expenditures in India is the National Sample Survey (NSS) which has annually collected comprehensive data on consumer expenditures since 1951. The NSS tabulations show consumer expenditures for rural and urban areas separately for most of the commodities, and services are shown by expenditure classes. In order to derive the coefficient of the average expenditure elasticity, the data were examined and appropriate demand models were formulated separately for each commodity. This was done to establish the relationship between expenditure on the commodity and total expenditure of the household. The expenditure elasticities thus derived were converted into income elasticities by applying the income elasticity of total national expenditure as a conversion factor.

The NCAER conducted a Household Consumption Survey in April 1960 primarily to collect data on incomes, expenditures, and quantities consumed of the selected commodities, thus providing latest estimates of income elasticities of demand. Also, it was felt that such a survey would throw light on the substitution effect among essential commodities. For the purpose of the survey a sample of about 1,800 households distributed over rural and urban areas was selected. These data provided a second set of income elasticities which was compared with the derived income elasticities from the NSS data.

An attempt was also made to derive income and price elasticities from time series data for the products under study. This was done to observe the effect of such dynamic elements as consumer tastes and preferences on consumption. Since the economy experienced a sharp turn towards planned development during the 1950's, it was considered essential to establish a relationship between consumption and income (or price) from the data relating only to the post-independence period. Trends prior to independence, therefore, were not used for projection purposes although they were compared with those obtained from other sources to the extent possible and necessary.

The income elasticities finally chosen for projection purposes in this study are based on a careful appraisal of the cross-section and time series data. It was assumed that the income elasticity thus chosen would remain constant over the projected period.

The second factor that should be taken together with income elasticity to project the per capita demand is the increase in per capita income. For this purpose, the targets of the increases in national income over the period 1960-61 to 1975-76 as envisaged in the Third Five Year Plan were used. The projected aggregate income was divided by the estimated population to derive per capita income at the end of each Plan period. The increase in per capita income was used together with the income elasticity to arrive at per capita demand for each commodity for the projected periods, 1965/66, 1970/71, and 1975/76.

The projected per capita demand was multiplied by the estimated population over the projected period to derive the aggregate estimates of demand for each commodity. For this purpose, the NCAER made a special study of the growth of population in rural and urban sectors separately over the period 1960/61 to 1975/76. The estimates of demand

thus derived relate only to direct consumption by households and not demand for other uses. Therefore, the second step consisted of estimating other demand for these commodities. The requirements of food grains for seed, feed, and waste are expected to increase in the case of wheat, rice, and pulses from about 12.5 percent to about 15 percent of production by 1975-76. In the case of coarse grains it is assumed this proportion will increase from 12.5 percent to about 25 percent by 1975-76. The demand for edible oils originating in industry was derived on the basis of the expected demand for oilseeds as raw materials. Requirements of oilseeds for direct consumption and other purposes were estimated separately and taken into account in arriving at aggregate demand. The estimated demand for cotton clothing was converted into cotton equivalent to which was added the demand for purposes other than the manufacture of cloth. The demand for different varieties of tobacco was estimated on the basis of data contained in the annual reports published by the Central Excise Department.

Supply — Supply projections were arrived at primarily on the basis of projected yield rates and acreages of the different crops under study. The programs of development envisaged by the Planning Commission over the projected period, to the extent of available information, were taken into account in estimating future supplies. The quantum of the benefits that are likely to flow from the proposed investments was discounted at various stages to make it conform as closely as possible to actual realization on the basis of past trends. Thus, investment allocation was appraised in the light of the available resources and various other factors in respect of each input. Further discounting of the expected benefits was by an examination of the time lags between the creation and utilization of facilities by farmers.

The acreage under each crop was projected, and then multiplied by the corresponding yield per acre, in order to arrive at the estimated production of that crop over the projected period. While projecting acreages, distinction was drawn between irrigated and unirrigated land taking into account the varying degrees of responses to different inputs in these 2 categories of land. The yield rates for irrigated and unirrigated land, with possible combinations of inputs, were separately estimated to obtain the projected yield rates for the entire area under cultivation.

Plans for reclamation of land and withdrawals from fallow were examined in deciding the extension of acreage under all crops. Adjustments were, however, made in view of the apparent technical and economic feasibility of the various schemes and also on the basis of past achievements.

The acreages that could be double or multiple-cropped were estimated on the basis of the projected irrigated area. This was determined primarily by the targets of investment in irrigation proposed by the Government. The allocation of irrigation water was apportioned to different crops on the projected future demand for the particular commodity and other relevant economic variables. The gross area that could be sown by the end of each projected period was arrived at by adding the double or multiple-cropped area to the corresponding net area sown. It was decided to give preference to irrigated land in the matter of allocating fertilizers and manures, since the relative return would be higher in the case of irrigated areas.

An appraisal of the available information, based on field experiments and investigations carried out by various Governmental agencies, was made in order to estimate the input coefficients for the various crops under study. The experimental data, collected and analyzed by the Indian Council of Agricultural Research and other agencies over a number of years in various regions of the country to determine the input-output coefficients for fertilizers and manures, were thoroughly examined. The respective coefficients for each region as well as for all of India were arrived at by using appropriate weights. The yield rate of each crop was determined by taking into account the additional yield per acre due to different inputs during the projected period. The interactions between the various inputs were considered by estimating each coefficient separately for a single input and also jointly for more than 1 input. Thus, for example, the coefficients for improved seeds alone, as well as with water, were separately estimated for each crop.

The total additional yield per acre due to various inputs was superimposed on the base year yield to determine the final order of the yield rates over the projected period. The supply projections of the various crops under consideration were arrived at by multiplying the projected acreage under each crop with the corresponding projected yield rate.

Demand Projections

Per capita demand — The per capita demand for food grains, which NCAER arrived at by adding the demand for major cereals (wheat and rice), coarse grains, and pulses, is expected to increase gradually from an estimated 356 pounds per annum in 1960/61 to 406 pounds by 1975/76 (Table 1). This amounts to an increase of about 14 percent over a period of 15 years. The per capita consumption of major cereals, coarse grains, and pulses which was of the order of 8.6, 4.5, and 2.6 ounces per day respectively in 1960/61 is expected to be about 10.6, 3.7, and 3.4 ounces per day by 1975/76. As a result of their respective positive and negative income elasticities, major cereals and pulses are expected to show an increasing trend in contrast to a declining rate in per capita consumption of coarse grains. The percentage share of major cereals, coarse grains, and pulses in total food grains thus will change from 55, 29, and 16 percent respectively in 1960/61 to 60, 21, and 19 percent respectively by 1975/76.

The per capita demand for food grains in rural areas which was substantially higher than that in the urban areas in the base year is expected to rise at a much faster rate over the projection period. The rural per capita demand is expected to increase from 374 pounds in 1960/61, to about 437 pounds in 1975/76, an increase of about 17 percent. Urban per capita demand, however, is expected to go up by only about 5 percent over the average of some 275 pounds consumed in 1960/61.

The per capita demand for cotton clothing is estimated to reach a level of about 28 yards by 1975/76 as compared to about 16 yards in 1960/61. Mill-made cloth is expected to gain in importance with its contribution to total clothing, increasing from about 79 percent in 1960/61 to about 83 percent by 1975/76.

Per capita consumption of edible oils shows a substantial increase from some 5.7 pounds in 1960/61 to 8.7 pounds by 1975/76. The percentage share of the different edible oils in the total consumption of oils is projected to show no significant change over the 15-year period.

Table 1

India: Projected annual per capita demand for selected commodities to 1975/76, with 1960/61 comparison

	Unit	1960/61 estimated	1965/66 projected	1970/71 projected	1975/76 projected
Food grains 1/	Pounds	355.9	370.1	386.6	406.4
Major cereals 2/	"	195.3	209.3	224.8	242.5
Coarse grains	"	102.1	96.5	90.9	85.2
Pulses	"	58.6	64.3	70.9	78.7
Cotton clothing	Yards	16.2	18.0	20.1	22.6
Mill-made clothing	"	12.8	14.5	16.3	18.7
Handloom clothing	"	3.4	3.6	3.7	3.9
Edible oils 1/	Pounds	5.7	6.5	7.5	8.7
Peanut oil	"	3.0	3.5	4.0	4.7
Rape and mustard oil	"	1.7	2.0	2.3	2.7
Sesamum oil	"	0.8	0.9	1.0	1.2
Linseed oil	"	0.1	0.2	0.2	0.2
Tobacco	Ounces	22.8	24.6	26.6	29.6
Cigarette tobacco	"	3.4	4.3	5.5	7.4
Bidi tobacco	"	5.6	6.0	6.4	7.0
Other tobacco	"	13.8	14.2	14.8	15.2

1/ For human consumption only.
2/ Rice and wheat.

Source: National Council of Applied Economic Research (New Delhi), "Long-term Projections of Demand and Supply of Selected Agricultural Commodities, 1960/61 to 1975/76". 262 pp., Commercial Printing Press Ltd., Bombay, India, 1962.

The demand for cigarette tobacco at the per capita level is expected to be more than doubled by 1975/76 over the consumption level of 3.5 ounces in 1960/61. Bidi tobacco also shows an increasing trend but at a much lower rate of about 25 percent gain in per capita consumption over the same period. Other types of tobacco reveal an increase of about 10 percent in per capita demand over the 15-year period. The per capita demand of total tobacco is projected at about 25, 27, and 30 ounces respectively by 1965/66, 1970/71, and 1975/76.

Aggregate demand — NCAER's aggregate demand projections are arrived at as products of the per capita estimates of demand and the corresponding population at specified dates, in so far as direct household demand for food grains, cotton clothing, edible oils, and tobacco products is concerned. That part of demand which originates from sources other than direct household consumption is estimated separately and added to household demand to arrive at total demand for each of the commodities.

The aggregate demand for food grains is placed at 82 million tons in 1960/61, rising to 97 million tons, 115 million tons, and 136 million tons by the end of each of the succeeding 5-year periods (Table 2).

The demand for cotton which includes "derived demand" for cotton clothing and "other ex-factory demand" is expected to increase from about 5 million bales in 1960/61 to about 10 million bales by 1975/76.

The demand for oilseeds which represents "derived demand" for different kinds of oils, viz., peanut oil, rape and mustard oil, sesamum oil, linseed oil, and castor oil also exhibits a rapid upward trend, advancing from 6 million tons in 1960/61 to 13 million tons by 1975/76, at the rate of about 6 percent per annum.

The annual aggregate demand for tobacco is projected to increase from 284,000 tons in 1960/61 to about 340,000 tons during the Third Plan, 412,000 tons during the Fourth Plan, and 501,000 tons during the Fifth Plan periods.

Table 2

India: Projected annual aggregate demand for selected commodities to 1975/76, with 1960/61 comparison

Commodity	Unit	1960/61 estimated	1965/66 projected	1970/71 projected	1975/76 projected
Food grains	Million M.T.	81.6	96.9	114.8	135.6
Major cereals 1/	"	44.5	54.3	65.9	79.0
Coarse grains	"	23.7	25.9	28.3	31.2
Pulses	"	13.4	16.7	20.6	25.4
Cotton	Million bales 2/	5.4	6.6	8.1	10.0
Oilseeds	Million M.T.	6.1	7.7	10.1	13.1
Tobacco	Thousand M.T.	283.5	340.4	412.5	500.9

1/ Rice and wheat.
2/ Bales of 392 pounds net.

Source: National Council of Applied Economic Research (see Table 1).

Supply Projections

The NCAER supply projections indicate that the production of food grains will increase from about 78 million metric tons in 1960/61 to 97 million in 1965/66, 118 million in 1970/71, and to 142 million by 1975/76 (Table 3). The production of wheat, which stood

Table 3

India: Projected production of selected crops to 1975/76, with 1960/61 comparison

Crop	1960/61 estimated 1/	1965/66 projected	1970/71 projected	1975/76 projected
	1,000 metric tons			
All food grains	77,993	97,229	117,880	141,639
Major cereals	41,961	54,479	68,241	84,106
Rice	30,623	39,132	48,023	58,859
Wheat	11,338	15,347	20,218	25,247
Coarse grains	22,592	25,898	29,135	31,599
Jowar	8,328	9,209	10,108	11,026
Bajra	3,442	3,819	4,209	4,551
Corn	3,102	3,788	4,547	4,995
Barley	3,326	4,051	4,588	4,934
Ragi	2,109	2,509	2,995	3,289
Small millets	2,285	2,522	2,688	2,804
Total pulses	13,440	16,852	20,504	25,934
Chickpeas (gram)	6,978	8,453	10,029	12,393
Tur	2,089	2,519	2,964	3,614
Other pulses	4,373	5,880	7,511	9,927
Cotton 2/	4,736	6,114	8,066	10,499
All oilseeds	6,216	7,795	10,606	14,470
Peanuts	4,218	5,287	7,223	9,905
Rape and mustard	1,011	1,297	1,777	2,409
Sesamum	449	557	737	987
Linseed	421	507	669	896
Castor	117	147	200	273
Tobacco	312	388	468	585

1/ Estimates as used in NCAER study. For most commodities there has since been some revision in official production estimates.

2/ In thousand bales of 392 pounds net.

Source: National Council of Applied Economic Research (see Table 1).

at about 11 million tons in 1960/61, is projected to go up to 15 million, 20 million, and 25 million tons by the end of the Third, Fourth, and Fifth Plan periods respectively. The increase by the end of the Fifth Plan period, thus, amounts to about 120 percent over the level of output in 1960/61. The NCAER considers this a reasonable estimate due to the rapid rate of increase in the production of wheat during the 1950's. Further, it appears to be in conformity with the belief that some coarse grain growers are shifting to wheat. Rice production is projected to go from 31 million tons (milled basis) in 1960/61 to 59 million in 1975/76.

The production of coarse grains is expected to rise from about 23 million tons in 1960/61 to 32 million tons by 1975/76, an increase of only 40 percent. This relatively small increase for coarse grains is expected because of the projected decline in per capita demand.

The supply of pulses is expected to rise steadily from 13 million tons in 1960/61 to 26 million tons by 1975/76. This increase is expected mainly due to the larger acreage for these crops over the projected period by double cropping.

The production of cotton is projected to increase from 4.7 million bales of 392 pounds net in 1960/61 to 6.1 million, 8.1 million, and 10.5 million bales respectively, by the end of the Third, Fourth, and Fifth Plan periods. A substantial portion of this increase is expected through expanded irrigation.

The production of oilseeds is expected to increase from 6 million tons in 1960/61 to 14 million tons by 1975/76. Among the oilseeds, peanuts occupy the most important place, accounting for over two-thirds of the total production. This crop appears to retain its position, more or less, throughout the projected period. The production of rape and mustard is projected to increase by about 140 percent by 1975/76. Linseed, which has considerable demand for industrial purposes, and sesamum are also expected to increase by well over 100 percent during the projected period, while the increase for castor is expected to be even greater.

India's production of tobacco is projected to reach a level of about 585,000 tons by 1975/76, nearly double the output in 1960/61.

Alternative Projections

The above projections of demand and supply were based on the NCAER's best judgment about the key factors which determine the magnitudes. However, NCAER considered it probable that some of the assumptions used will prove to be either over-optimistic or over-pessimistic in relation to actual achievements. Therefore, a study of the results obtained by the use of various alternative assumptions was conducted by NCAER.

Alternative assumptions on the order of magnitude of the variables influencing demand result in projections of the 1975/76 demand for food grains from a low of 134 million to a high of 139 million metric tons. This is contrasted with the 136 million metric tons which NCAER considers most probable (Table 4). For cotton the alternatives of aggregate demand in 1975/76 range from 9.7 to 10.2 million bales, for oilseeds from 12.6 to 13.2 million metric tons, and for tobacco from 486,000 to 512,000 metric tons.

Table 4

India: NCAER alternative projections to 1975/76 of demand for selected commodities, with 1960/61 comparison

Commodity	Unit	1960/61 estimated	1965/66 projected	1970/71 projected	1975/76 projected
Food grains	Million				
Projection I	metric tons	81.6	96.3	113.7	133.7
Projection II	"	81.6	97.0	114.6	134.2
Projection III	"	81.6	97.3	116.4	139.3
Projection IV	"	81.6	97.0	114.9	135.6
Cotton	Million				
Projection I	bales 1/	5.4	6.5	7.9	9.7
Projection II	"	5.4	6.6	8.1	10.1
Projection III	"	5.4	6.6	8.2	10.2
Projection IV	"	5.4	6.6	8.1	10.0
Oilseeds	Million				
Projection I	metric tons	6.1	7.6	9.8	12.6
Projection II	"	6.1	7.7	10.0	12.7
Projection III	"	6.1	7.8	10.1	13.2
Projection IV	"	6.1	7.7	10.1	13.1
Tobacco	Thousand				
Projection I	metric tons	283.5	336.3	404.4	485.7
Projection II	"	283.5	340.4	412.5	500.9
Projection III	"	283.5	341.4	416.6	512.1
Projection IV	"	283.5	340.4	412.5	500.9

1/ Bales of 392 pounds net.

Note: Projection I uses a lower per capita income than the others. Projection II uses alternative income elasticities. Projection III uses alternative population estimates. Projection IV is the one which the NCAER considers the most probable.

Source: National Council of Applied Economic Research (see Table 1).

Alternative supply projections developed by NCAER produce a range in 1975/76 production of food grains from a low of 137 million to a high of 145 million metric tons (Table 5). For cotton the 1975/76 production range is from 10.1 to 10.7 million bales, for oilseeds from 14.0 to 14.8 million metric tons, and for tobacco from 562,000 to 596,000 metric tons.

An estimate of the gap between production and demand under alternative conditions can be obtained. This is done by matching the range of magnitude for both demand and production in the various assumptions presented above.

A comparison of the alternative projections in regard to food grains shows that by 1965/66, the country could have a surplus of about 3 million metric tons under the most favorable of assumptions, or could face a deficit of about 5 million metric tons under the least favorable assumptions (Table 6). By the end of the Fourth Plan period, the country might have a surplus of about 7 million metric tons under the most favorable assumptions. Under the least favorable assumptions considered, the country would have a food grain deficit of about 3 million metric tons in 1970/71. By 1975/76 the surplus could go as high as 11 million metric tons, while under the least favorable assumptions the country would still have a deficit of 2 to 3 million metric tons.

Table 5

India: NCAER alternative projections to 1975/76 of production of selected commodities, with 1960/61 comparison

Commodity	Unit	1960/61 estimated	1965/66 projected	1970/71 projected	1975/76 projected
Food grains	Million				
Projection I	metric tons	78.0	99.3	121.2	145.2
Projection II	"	78.0	92.9	113.0	136.7
Projection III	"	78.0	97.2	117.9	141.6
Cotton	Million				
Projection I	bales 1/	4.7	6.2	8.2	10.7
Projection II	"	4.7	5.8	7.6	10.1
Projection III	"	4.7	6.1	8.1	10.5
Oilseeds	Million				
Projection I	metric tons	6.2	7.9	10.8	14.8
Projection II	"	6.2	7.6	10.4	14.0
Projection III	"	6.2	7.8	10.6	14.4
Tobacco	Thousand				
Projection I	metric tons	312.0	395.2	481.6	596.4
Projection II	"	312.0	366.8	448.1	561.9
Projection III	"	312.0	388.1	468.4	585.3

1/ Bales of 392 pounds net.

Note: Projection I uses more favorable alternative assumptions. Projection II uses less favorable alternative assumptions. Projection III refers to the one which the NCAER considers the most probable.

Source: National Council of Applied Economic Research (see Table 1).

Table 6

India: NCAER alternative projection to 1975/76 of import demand (-) for or export surplus (+) of selected commodities with 1960/61 comparison

Commodity	Unit	1960/61 estimated	1965/66 projected	1970/71 projected	1975/76 projected
Food grains	Million				
Projection I	metric tons	(-) 3.6	(+) 2.9	(+) 7.5	(+) 11.5
Projection II	"	(-) 3.7	(-) 4.5	(-) 3.4	(-) 2.6
Projection III	"	(-) 3.7	(+) 0.3	(+) 3.0	(+) 6.1
Cotton	Million				
Projection I	bales 1/	(-) 0.7	(-) 0.3	(+) 0.3	(+) 1.1
Projection II	"	(-) 0.7	(-) 0.8	(-) 0.6	(+) 0.5
Projection III	"	(-) 0.7	(-) 0.5	2/	(+) 0.5
Oilseeds	Million				
Projection I	metric tons	(+) 0.1	(+) 0.3	(+) 1.0	(+) 2.2
Projection II	"	(+) 0.1	(-) 0.1	(+) 0.3	(+) 0.8
Projection III	"	(+) 0.1	(+) 0.1	(+) 0.5	(+) 1.3
Tobacco	Thousand				
Projection I	metric tons	(+) 28.0	(+) 51.0	(+) 77.0	(+)111.0
Projection II	"	(+) 28.0	(+) 25.0	(+) 31.0	(+) 50.0
Projection III	"	(+) 28.0	(+) 48.0	(+) 56.0	(+) 84.0

1/ Bales of 392 pounds net.
2/ Negligible.

Note: Projection I is for the most favorable assumptions. Projection II is for the least favorable assumptions. Projection III is the one which the NCAER considers the most probable.

Source: National Council of Applied Economic Research (see Table 1).

The situation in regard to cotton suggests that under the worst and best of assumed conditions, the projections will vary from a surplus of 90,000 up to one of over 1 million bales by 1975/76. This variation is possible because cotton production will be substantially influenced by the application of inputs like irrigation.

Under alternative assumptions the projections for oilseeds indicate that under the least favorable assumptions the demand and supply will be more or less in balance. Under the most favorable assumptions there could be a surplus of some 2 million metric tons by 1975/76.

The position of tobacco is one of a surplus with some degree of variation. By 1975/76, the country may have a minimum surplus of about 50,000 metric tons or a maximum of about 111,000 metric tons under the range of conditions assumed.

EVALUATION OF NCAER STUDY

This section is a summary of pertinent parts of a July 1963 unpublished report to USDA by John W. Mellor of Cornell University entitled "Review and Analysis of the National Council of Applied Economic Research Study of Long-term Projections of Demand for and Supply of Agricultural Commodities, 1960/61 to 1975/76".

After the NCAER study of the long-term projections of demand and supply of agricultural commodities for India became available, Professor Mellor of Cornell University, under an arrangement with the U. S. Department of Agriculture, undertook to make an evaluation of the study. This was believed to be particularly desirable in the case of India due to the larger role that country has played as an export outlet for several U. S. farm products, particularly wheat. Since he and his colleagues at Cornell University have already conducted some research on various facets of India's agricultural economy, Professor Mellor was considered especially qualified for this assignment. It was also considered important that the Cornell analysts have access to information that had not become available before the NCAER study was completed.

As the evaluation of the NCAER projections proceeded, the Cornell investigators concluded that proper perspective regarding the long-term projections required an appraisal of the rate of growth of agricultural production in the period of the first 2 Five Year Plans. An analysis of the causes of change in production during that period was also thought necessary. Thus, one of the major investigations was a careful study of change in production in the period of the first 2 Plans.

From this analysis it was concluded that production of food grains in India increased in the 1950/51-60/61 period at a rate no greater than 2.5 percent, and quite possibly at a rate as low as 2.0 percent per year. This compares with commonly quoted estimates of up to 3.9 percent per annum.

The Cornell University investigators conclude that if the rate of increase of food grains production was 2.5 percent per year, it is likely that about two-thirds of the increase was due to increased acreage under cultivation, both irrigated and unirrigated. The remaining third was due to increased yields per acre. Probably more labor per acre, and the joint effect of inorganic fertilizer and related inputs, were equally responsible for the increased yield.

Response Coefficients

Increasingly, agricultural production in India will become dependent on the expanded use of inorganic fertilizers. This gives considerable importance to the fertilizer response coefficients used in projections. It is concluded, in reference to current levels of utilization, that the response coefficients used by the NCAER are, in general, reasonable and perhaps in error on the low, rather than the high side.

Although the NCAER coefficients are judged reasonable with the current levels of utilization of fertilizers, it is not clear that these rates of response can be maintained as large increases occur in supplies of fertilizer. Maintenance of this level of response depends on the pace of agricultural research, the development of improved seed programs, and upon expanded irrigation facilities.

A general review was also made of the other response coefficients used in the NCAER study. In terms of past experience, most of these coefficients seem reasonable. From this study it became increasingly apparent that the principal questions which should be raised about the NCAER projections are not the response coefficients, but the input quantities. Most important in this regard is the rate of increase in irrigated acreage and in inorganic fertilizers. As the fertilizer input increases, a further question will arise concerning the fertilizer response coefficient.

Supply and Demand

It is important to keep clearly in mind that the demand for agricultural commodities is strongly conditioned by projections of income. These are, in turn, greatly influenced by the change in production of agricultural commodities. The NCAER work implicitly assumes that supply and demand are independent, but probably assumes levels in each case which are roughly consistent with each other.

Agricultural commodities make up about half of the national income of India. Food grains alone comprise nearly one-third of the national income. The NCAER demand projections are based, in part, on the Planning Commission's national income estimates. Those, in turn, are presumably based on projections of agricultural production not greatly different from those developed by the NCAER. Hence, a downward adjustment in expected production would cause a downward adjustment in expected income and in expected demand. It is very important that this inter-relationship be kept in mind when one side or the other of the supply-demand equation is changed.

The average annual rate of increase in supply depicted by the NCAER for each of the three 5-year periods and for the whole period are indicated below, with comparison NCAER estimates for increases in demand:

Period	Supply (Percent)	Demand
1960/61 - 1965/66	4.5	3.5
1965/66 - 1970/71	3.9	3.4
1970/71 - 1975/76	3.7	3.4
1960/61 - 1975/76	4.0	3.4

As a general observation it would seem more reasonable from historical experience with agricultural development to expect the rate of production to increase over time rather than to show the significant decrease in rate depicted. In addition, comparison with progress in the first 2 Plan periods suggest on prima facie grounds that acceleration to a rate of 4.5 percent in the third Plan period is excessively optimistic.

Inputs Affecting Production

NCAER's projected increases in production trace from 4 primary sources as follows: (1) increased organic forms of nitrogen; (2) increased inorganic fertilizers; (3) increased irrigation; and (4) improved seed. A number of other factors are considered in the study and given weight but their influence is dominated by the 4 above.

In the case of rice and wheat, the 2 principal and most important food grains, in the period 1960/61 to 1975/76, about 25 percent of the increase in yield is directly attributable to added organic forms of nitrogen; 45 percent to added inorganic fertilizers; 10 percent to improved seed; and 20 percent to a relative increase in irrigated acreage. The response from fertilizer and improved seed presumably depends on their both being present simultaneously. Likewise, a good deal of the expected response from fertilizer presumably depends on the expected increase in irrigation.

Organic fertilizers — Review of a substantial number of sources on the subject of green manure, particularly as it applies to India, suggests that green manure is unlikely to increase greatly in popularity among Indian farmers. For this reason, the green manure contribution can probably be largely ignored in projections of supply. Since green manure is given importance in the NCAER projections, there will be a substantial downward adjustment in the supply projections.

Animal manures are the other important source of organic nitrogen projected in the NCAER study. The huge increase in animal manure projected by NCAER assumes complete utilization of present supplies of manure for fertilizer, plus a substantial expansion in animal numbers. It is doubtful if it presently makes economic sense in India to switch the use of manure from fuel to fertilizer. For this and related economic reasons, it seems unreasonable to assume that animal manures will provide a significant part of increased fertilizer supply in the next 15 years.

Inorganic fertilizers — Expansion of the supply of inorganic fertilizer is dependent on a number of factors including allocation of foreign exchange to imports of fertilizer, allocation of foreign exchange to permit building more fertilizer production facilities, and economic and political factors concerned with the location and development of the fertilizer industry. In any case, the nation will be sorely pressed to achieve the levels of supply projected by the NCAER. It seems more reasonable to project the actual supply at two-thirds of that projected by the NCAER for the end of each plan period.

Irrigation — The NCAER estimates of irrigated land appear quite optimistic in view of the time lag for bringing in small irrigation schemes and depreciation of medium and small irrigation works. They are also very optimistic compared to those of the Planning Commission. Indeed, the Third Five Year Plan sets 175 million acres (gross) as the ultimate irrigation potential in India. The NCAER estimate of 197 million acres irrigated by 1975/76 seems unduly optimistic. This appears at best to be too high by about one-third.

Improved seed — The NCAER projects the effect of improved seed separately from fertilizer in their additive function. In fact, there is probably such close interaction that they might better be considered jointly. If that were done, it would in effect push the response to inorganic fertilizer with a complement of improved seed up by some 20 percent above the level of inorganic fertilizer alone.

Table 7

India: Alternative projections of total food grain production to 1975/76, with 1960/61 comparison 1/

Assumption	1965/66 projected	1970/71 projected	1975/76 projected
	------ Million metric tons - - - -		
1. NCAER's most likely projection adjusted to a 1960/61 base of 76 million tons instead of the NCAER base of 78 million tons	96	116	140
2. Constant rate of increase of 2.0 percent. This is the lowest reasonable assumption for what happened in the 1951-61 period	84	92	103
3. Constant rate of increase of 2.25 percent	85	96	107
4. Constant rate of increase of 2.5 percent. The most likely achievement in 1951-61	86	98	111
5. Constant rate of increase of 3.4 percent. The official claim for achievement in 1951-61	89	107	126
6. Using the NCAER's estimates of input quantity and response coefficients and including increases in input quantity for only (1) irrigated land, (2) unirrigated land, (3) inorganic fertilizers, and (4) improved seeds on irrigated land. The principal exclusions are organic fertilizers and improved seeds on unirrigated land	89	109	127
7. Same as 6 above but two-thirds as much inorganic fertilizer input in each period. This still allows 30 pounds of fertilizer per acre on all the area considered likely to be irrigated in each period (estimated as two-thirds of the NCAER estimate)	83	97	111

1/ All projections assume a base year 1960/61 production of 76 million metric tons. From the study of past trends, this seems to be a reasonable "weather adjusted" base. The 1960/61 base used by NCAER is 78 million metric tons.

Source: John W. Mellor of Cornell University, unpublished report.

Even with a significantly downward revised estimate of growth in supply and use of inorganic fertilizers, India will still be hard pressed to increase seed production rapidly enough to meet the expanding needs. The NCAER study gives little attention to the very great problems of multiplying and distributing improved seed. In addition, the NCAER estimates of current use of improved seed are either well off the mark or based on a very broad definition of improved seed.

Conclusions

On the basis of the above comments it seems reasonable to adjust the NCAER projections by (1) eliminating the response to organic fertilizers, (2) reducing by about one-third the projections of supply of inorganic fertilizers, and (3) reducing somewhat the production increase due to irrigation.

Various combinations of assumptions were developed that produced alternative sets of projections for the production of food grains in India (Table 7). Assumption 7 in this table appears most consistent with the foregoing analysis. The resultant projection is thus for food grain production to advance to 83 million metric tons in 1965/66, 97 million in 1970/71, and 111 million in 1975/76. The above rate of increase is almost exactly the same as the 2.5 percent rate estimated to have been achieved during the first 2 Plan periods. Even that rate will in the future depend on substantial increases in availability of inorganic fertilizers and expansion of the absorbitive capacity for fertilizer through research and other measures. This estimate also presumes that the NCAER estimates regarding irrigation expansion will be achieved.

The intensive study done at Cornell University was concerned entirely with food grains. However, the nature of the allocational function used by the NCAER for inputs suggests that the adjustments seen as in order for food grains would apply in general to other crops.

THIRD FIVE YEAR PLAN

Background

National planning has been firm Indian Government policy since the country gained its independence in 1947. In 1950 a Planning Commission was established by the Government to assess the resources of the country and formulate plans for their development. This commission drafted India's First Five Year Plan for the period April 1951-March 1956. Completion of the Plan was followed by the Second Five Year Plan (April 1956-March 1961). The country is currently in its Third Plan and at least rough outlines have been developed for 2 further Five Year Plans.

Because of the difficult food and fiber situation that prevailed in 1950 and 1951, agriculture and related programs were given high priority in the First Five Year Plan. Food grain, fiber, and oilseed targets were reached or exceeded. Agriculture was also important in the Second Plan but major emphasis was placed on industrialization. Substantial progress was made on the farm front, but actual production of food grains and fibers in the final year of the plan were well short of target levels.

Third Plan Targets

One of the basic objectives set forth in India's Third Five Year Plan is the achievement of self-sufficiency in food grains and in boosting the output of industrial and export crops. To accomplish this objective, the Plan accords first priority to agricultural development programs. In the Third Plan an overall increase of 30 percent in agricultural output is envisaged over the 5-year period, 1961/62 through 1965/66. Production targets are much higher than the projections computed by Professor Mellor at Cornell University or even those of the NCAER (Table 8).

Table 8

India: Third Five Year Plan production targets for selected commodities, with comparisons, 1965/66

Commodity	Mellor's most likely projection	NCAER projection	Third Plan targets
	- - - - - - - - - -Thousand metric tons - - - - - - - - -		
Food grains (including pulses)	83,000	97,229	101,600
Cotton 1/	2/	6,114	7,065
Oilseeds	2/	7,795	9,977
Tobacco	2/	388	330

1/ In thousand bales of 392 pounds net each.
2/ Not computed.

Source: National Council of Applied Economic Research (see Table 1). The report of John W. Mellor (see Table 2). Planning Commission, Government of India, "The Third Five Year Plan, 1960/61 to 1965/66". 731 pp., New Delhi.

Much of the planned increase in agricultural production is expected to be realized through an increase in yields per acre — about 27.5 percent above the Second Plan average for rice, 14 percent for cotton, and 11 percent for oilseeds. Double cropping is also considered in the Plan to be an important factor in increasing total agricultural production. The Plan contemplates that 67 million acres, or about a fifth of all cultivated land, will be sown to more than 1 crop by 1965/66 as against about 52 million acres in 1960/61. About 7 million additional acres of waste land are proposed to be reclaimed and brought under cultivation during the Third Plan period.

Mid-term Appraisal

In November 1963 the Planning Commission of the Government of India issued a report entitled "The Third Plan Mid-term Appraisal". This report is particularly significant to an evaluation of the NCAER projections study. Many of the assumptions in that study were in essence based on the thesis that the agricultural development programs outlined in the Third Plan would essentially be achieved. The remainder of this section is a summary of the pertinent highlights of the mid-term appraisal.

The appraisal report notes that in comparison with the Third Plan targets, there is likely to be a substantial shortfall in the output of food grains. There may also be a shortfall in the production of cotton and oilseeds. The estimate for tobacco is considered likely to be realized.

The progress achieved in the implementation of major agricultural development programs in the first part of the Third Plan, together with the Planning Commission's projections of achievement by the end of the Plan, is indicated in the following paragraphs.

Irrigation — The total additional area that will be brought under small irrigation schemes in the first 3 years of the Plan is estimated at 7 million acres or 54 percent of the target set for 1965/66. The Planning Commission anticipates that instead of the Plan target of 12.8 million acres, a total of 13.8 million additional acres may be added to the area irrigated by small irrigation projects during the Plan period.

For major and medium irrigation projects the situation is not so favorable. The target for additional potential and utilization in the Third Plan is 16.3 million acres and 12.8 million acres, respectively. The additional potential estimated to have been created in the first 2 years is placed at 2.2 million acres and the utilization at 2.0 million acres. Likely achievements by the end of the Third Plan are estimated at 11.1 million acres of potential and 10.0 million acres of utilization which would mean a shortfall of 5.2 million acres and 2.8 million acres, respectively, as compared to the targets. The shortfall in potential is attributed to the following factors: (1) over-optimistic setting of targets by a number of states at the time of the formulation of the Third Plan; (2) delay in the completion of certain projects due to an increase in their estimated cost partly as the result of under-estimation at the initial stage, and partly due to the rising costs of materials and wages; (3) shortages of cement, steel, and other essential materials; and (4) inadequate foreign exchange for the import of all the required machinery and spare parts.

Fertilizers — The Third Plan envisages an increase in the consumption of nitrogenous fertilizers (N) from an estimated 230,000 tons in 1960/61 to 1 million tons in 1965/66, phosphatic fertilizers (P_2O_5) from 70,000 tons to 400,000 tons, and potassic fertilizers (K_2O) from 25,000 tons to 200,000 tons. The actual progress so far, however, has been much less than was expected, mainly because it has not been possible to make anticipated supplies available to farmers.

The total domestic production of nitrogenous fertilizers at the end of the Plan is now forecast at roughly 500,000 tons compared to 800,000 tons originally assumed. The quantities of nitrogenous fertilizers imported in the first 3 years of the Plan are placed at 156,000, 204,000, and 225,000 tons of nitrogen, respectively.

At the end of the Second Plan, the quantity of urban compost produced totaled about 2.4 million tons per annum. Production in 1961/62 and 1962/63 is reported to have totaled 2.6 and 2.9 million tons respectively, as against the target of 5 million tons set for 1965/66.

The Third Plan includes a target for bringing an additional area of about 30 million acres under green manuring by 1965/66. However, the additional area benefiting by green manuring is placed at only about 2 million acres in 1961/62, 4 million acres in 1962/63, and 6 million acres in 1963/64.

Improved seeds — The Third Plan envisages an increase in the area under improved seeds from about 55 to 203 million acres, or a total increase of 148 million acres. However, available information indicates that the area under improved seeds increased by only about 46 million acres in the first 3 years of the Plan.

Plant protection — The Third Plan envisages the extension of plant protection measures to 50 million acres by 1965/66, compared to 16 million acres in 1960/61. However, available information indicates that the additional area served by plant protection measures in the first 2 years was only a little over 1 million acres. The lack of progress in extending plant protection measures is attributed partly to inadequate supplies of insecticides, pesticides, and equipment and partly to deficiencies in the distribution system.

Implements and equipment — Progress in the introduction of new implements and equipment has been slow. The Third Plan envisages that all extension training centers, numbering 100 in all, should be equipped with agricultural workshops for providing training facilities in the use of improved implements and equipment to village level workers, mechanics, and artisans. However, at the mid-point of the Plan the number of such workshops totaled only 31 as compared with 25 at the end of the Second Plan.

Livestock — According to the Appraisal, the major limitations that held up the development of animal husbandry during the first 2 Plans, namely, a large proportion of uneconomic and surplus cattle, deficient nutrition, and a shortage of good quality breeding stock, still persist.

CONCLUSIONS AND IMPLICATIONS

Estimates of total farm production in India in 1963/64 show little change from the previous year. The USDA computed index of agricultural production for India has remained at about 130 (1952/54 = 100) since 1960/61. There were significant gains made in the decade of the 1950's. As India's population is steadily increasing, an actual decline in per capita farm production has occurred. Relatively unfavorable weather undoubtedly has been a causative factor in lack of expansion of Indian agriculture. However, the principal causes are failure to implement as planned the country's major agricultural development programs and the failure in many cases to achieve expected production gains where agricultural development programs have been implemented.

Since Indian agriculture has not moved forward as planned, the country's food imports are projected to trend upward over the period to 1975/76 (Table 9). Consequently, there is more reason than ever for a reappraisal of the NCAER projections of demand and supply for selected agricultural commodities and an evaluation of the implications for U.S. agricultural exports. Considerably more recent information is, of course, available than was obtainable when the NCAER study was conducted. Professor Mellor's study provides the best single evaluation available for such a reappraisal. The mid-term appraisal of the Third Five Year Plan also provides a great deal of enlightening information on the degree to which the NCAER projections are likely to be achieved, especially as the projections were made under the assumption that most of the agricultural development programs in the Plan would be substantially achieved. A careful study of the above, together with

other recent appraisals of the agricultural and overall economic situation in India, leads to general agreement with the overall conclusions of the Mellor study.

Table 9

India: Projected gross imports of selected agricultural commodities, 1965/66, 1970/71, and 1975/76

Commodity	Unit	1965/66	1970/71	1975/76
Food grains				
Wheat	Million metric tons	3.8	5.0	5.5
Rice	"	0.5	0.5	1.0
Other	"	0.2	0.5	0.5
Total	"	4.5	6.0	7.0
Cotton	Million bales 1/	0.7	0.6	0.5
Vegetable oils	Million metric tons	0.1	0.1	0.1
Tobacco	Million metric tons	2.0	2.0	2.0

1/ Bales of 392 pounds net.

Source: Economic Research Service, USDA.

Food grains — The Mellor projection for food grain production to advance to 83 million tons in 1965/66, 97 million in 1970/71, and 111 million in 1975/76 is considered to be the best available analysis. Population is expected to go up nearly as rapidly, though probably at a slightly lower rate. Consequently, the per capita availability of domestically produced food grains is expected to be only slightly higher in 1975/76 than at present.

The import requirements for food grains are expected to gradually increase over the period to 1975/76 despite the projection of at least no decline in per capita production. It is expected that real per capita income will show a moderate increase and that this will be reflected in a somewhat higher per capita demand for food grains. Therefore, India's minimum average annual import requirements for food grains by 1975/76 will probably total roughly 7 million metric tons or approximately double the average of recent years (Table 10). Imports are expected to continue to consist primarily of wheat, followed in order by rice, corn, and millets.

Except following unusually favorable crop years, India's food grain import needs through 1975/76 will probably be at a level that will tax the ability of its port storage facilities unless these are expanded and improved more rapidly than is now anticipated. These facilities can presently handle a maximum of roughly 5 million tons of imported grain annually. It is assumed that they will be expanded by a maximum of 50 percent by 1975/76. In consequence, India's 1975/76 ability to properly handle imported food grains is expected to approximate 6 to 7 million metric tons.

Table 10

India: Principal food grain imports, by country of origin, 1951-62 1/

Country	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
	Wheat (1,000 metric tons)											
United States . .	2,279	1,429	491	26	140	632	2,695	2,237	2,778	4,388	2,406	2,846
Canada	343	534	423	2/	9	2/	11	765	259	38	158	46
Australia	195	174	380	200	311	627	168	15	111	309	396	356
Argentina	521	0	249	2/	2/	2/	2/	2/	2/	2/	2/	2/
Other	130	2/	2/	102	2/	55	2/	2/	2/	2/	2/	2/
Total	3,468	2,137	1,543	328	460	1,314	2,874	3,017	3,148	4,735	2,960	3,248
	Rice (1,000 metric tons)											
Burma	309	383	152	635	269	278	532	389	295	336	160	187
United States. .	0	0	0	0	2/	48	197	2/	2/	257	194	253
Thailand	219	187	2/	2/	2/	2/	2/	0	0	0	0	0
Other	3/ 233	4/ 164	41	19	38	53	38	7	0	5/ 106	30	0
Total	761	734	193	654	307	379	767	396	295	699	384	440

1/ India's commercial trade statistics are incomplete for these commodities. Therefore, U. S. Dept. Agr. data are used. 2/ Negligible, included in Other. 3/ Contains 161,000 metric tons from Pakistan and 67,000 metric tons from Communist China. 4/ Contains 150,000 metric tons from Communist China 5/ Contains 106,000 metric tons from Egypt.

Source: See Tables 24 and 25 in: Richards, Stanley I. Trends in India's Agricultural Trade. U. S. Dept. Agr., Econ. Res. Serv., Foreign Agr. Econ. Rpt. 15. February 1964.

The 1975/76 level of India's food grain imports will most likely be materially influenced by U.S. Government policy toward concessional exports, because India's foreign exchange earnings are expected to continue to fall short of the amount required to finance the development goods needed for its Five Year Plan, plus minimum requirements for imported consumer items, including food grains.

Provided India can obtain foreign produced food grains on sufficiently liberal concessional terms actual 1975/76 imports are anticipated to be somewhere near the maximum that its port and storage facilities can properly handle, i.e., in the neighborhood of 6 to 7 million metric tons. As in the past, concessional terms for any great volume of food grains are considered unlikely to be available from any country other than the United States.

Other commodities — The Mellor study at Cornell University did not concern itself with commodities other than food grains. However, the report does point out that the nature of the allocational function used by the NCAER for inputs suggests that the adjustments seen as in order for food grains would apply pretty much across the board to other crops. The Economic Research Service, USDA, has reevaluated the projections for cotton, oilseeds, and tobacco on the basis of the above observation, along with the other material cited in this section.

Cotton — India both imports and exports cotton, but on balance is a net importer (Table 11). Imported cottons are higher valued, longer staple varieties, while exported cottons are shorter staple, lower valued varieties. Demand for imported raw cotton is influenced by domestic raw cotton production, internal demand, and the export demand for textiles. An interesting aspect of the cotton import pattern by country of origin is the absence of a dominant supplier. Imports from the United States show a pronounced decline from 1952. The exceptions in 1957, 1960, and 1961 resulted from sales for Indian currency under P.L. 480.

Cotton consumption in India by 1975/76 is anticipated to total roughly around 8 million bales. An Indian bale weighs 392 pounds net. Gross imports may approximate a half million bales composed largely of the grades and staple lengths normally exported by the United States. The United States will continue to be in competition with East African countries and also possibly other countries for this market. The availability of U.S. cotton on concessional terms may well influence the total volume of India's cotton imports as well as the share taken from the United States. India's exports are anticipated to show little change from the level of recent years and are expected to continue to be primarily of types that offer little competition to U.S. cotton sales in the world market.

Oilseeds — Before the Second World War, India was one of the world's leading exporters of fats and oils, including the oil equivalent of oilseeds. Annual average exports in the 1930's totaled around a half million tons in terms of oil. Well over half of this consisted of peanuts; linseed and castorbeans were the other major items. Nearly all exports went to Western Europe, particularly the United Kingdom, Germany and France.

Indian exports fell to less than a quarter million tons during the war when shipping was disrupted. They continued to decline in the postwar period, reflecting the rising domestic consumption of vegetable oils, and reached a low of 26,000 metric tons in 1961 (Table 12).

Table 11

India: Foreign trade in cotton, by countries of origin and destination, 1951-62

Country	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
	IMPORTS (1,000 bales) 1/											
United States . .	384.1	836.0	34.9	206.7	68.2	68.4	484.7	122.5	108.0	576.6	710.7	267.2
Egypt	257.8	145.9	250.4	261.2	177.5	163.2	79.5	61.2	97.2	181.4	99.0	96.5
Kenya	183.0	148.8	191.0	195.7	240.4	230.7	80.7	134.4	158.1	164.1	119.4	82.0
Sudan.	85.2	31.2	101.5	17.6	108.4	119.6	63.2	78.5	152.0	104.6	102.0	236.0
Other.	39.9	17.8	43.2	16.6	27.0	55.0	39.3	11.9	28 7	124.5	60.8	189.6
Total . .	950.0	1,179.7	621.0	697.8	621.5	636.9	747.4	408.5	544.0	1,151.2	1,091.9	871.3
	EXPORTS (1,000 bales) 1/											
Japan	48.8	173.0	114.5	85 6	232.4	248.1	133.6	271.6	267.4	165.4	228.7	112 9
United States . .	68.7	20.5	41.1	9.6	14.7	3.1	5.4	10.7	10.1	5.2	18.3	14.4
United Kingdom	21.1	12.7	18.9	18.4	68.8	44.4	20.3	19.4	5.5	1.2	7.0	19.7
France	1.8	21.2	19.2	8.9	17.6	9.5	7.1	19.1	13.0	6.5	12.7	13.6
Other.	17.3	69.4	63.3	29.7	197.5	96.2	60.3	88.9	33.7	11.8	35.5	138.2
Total . .	157.7	296.8	257.0	152.2	531.0	401.3	226.7	409.7	329.7	190.1	302.2	298.8

1/ Bales of 392 pounds net each.

Source: Department of Commercial Intelligence and Statistics (8). Monthly Statistics of the Foreign Trade of India, Government of India, New Delhi, 1951-62

Table 12

India: Vegetable oil exports, by country of destination, 1951-62 1/

Country	1951 2/	1952 2/	1953 2/	1954 2/	1955 2/	1956 2/	1957	1958	1959	1960	1961	1962
	Metric tons											
United Kingdom	17,671	20,330	11,755	13,062	75,669	51,640	21,226	20,458	26,407	27,583	9,737	14,229
United States	4,443	20,780	17,534	11,403	28,063	21,877	17,040	304	13,950	22,712	–	205
Australia	12,685	3,999	5,021	1,551	11,061	4,235	6,679	10,005	7,900	3,180	624	4,678
Netherlands	10,979	22,998	3,855	9,522	70,595	6,721	976	6	9,549	119	3	3,110
Burma	3,986	9,443	116	11,142	34,828	2,245	140	118	14,342	1,008	244	2,424
USSR	3/	3/	3/	3/	3/	3/	4,324	6,498	6,231	6,015	10,396	7,970
Other	69,642	50,538	13,535	6,831	74,151	90,478	8,367	6,797	18,943	7,366	4,844	28,321
Total	119,406	128,088	51,816	53,511	294,367	177,196	58,752	44,186	97,322	67,983	25,848	60,937

1/ Includes: peanut, castor, sesame, mustard, and linseed oils.

2/ Mustard and sesame oil not shown by country.

3/ 1951-56 not available, negligible, or none; if negligible or not available, included in Other.

Source: Department of Commercial Intelligence and Statistics (see Table 11).

Table 13

India: Tobacco exports by country of destination, 1951-62

Country	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
	Metric tons											
United Kingdom	17,986	16,186	13,614	15,654	15,679	14,840	15,896	19,936	16,305	17,513	25,140	19,227
USSR	6,779	2,125	1/	1/	1/	1/	3,469	3,202	4,443	4,126	5,090	18,195
Communist China	1/	1/	1/	1/	13,424	12,888	1/	10,336	1/	1/	1/	0
Aden	2,057	1,362	2,864	2,955	2,475	2,751	3,599	3,445	4,560	3,783	3,978	2,992
Netherlands . .	1,520	1,069	1,239	1,154	1,302	1,585	2,375	1,472	1,965	1,489	1,879	1,172
Belgium	903	905	1,196	924	1,186	1,257	1,859	1,649	1,762	2,113	2,321	1,596
Other	24,632	14,851	12,622	12,945	10,770	8,946	9,194	8,048	8,638	11,685	9,588	21,098
Total . . .	53,877	36,498	31,535	33,632	44,836	42,267	36,392	48,088	37,673	40,709	47,996	64,820

1/ Negligible, not available, or none. If negligible or not available, included in Other.

Source: Department of Commercial Intelligence and Statistics (see Table 11).

It seems probable that future production increases will be roughly equal to the expected rise in total consumption. Probably India will continue to export limited quantities of certain oils, but will on balance in most years be a small net importer as it imports 90 to 100 thousand tons of copra annually. However, it appears unlikely that there will be a significant sustained demand from India for U.S. fats and oils over the period covered by these projections; although from time to time some imports of U.S. vegetable oils may occur if available on concessional terms. On the other hand, Indian vegetable oils may, in some years, offer limited competition to U.S. vegetable oils in world markets.

Tobacco — India is an important tobacco exporting country, shipping abroad over the past decade an annual average of about 40,000 metric tons (Table 13). Nevertheless the country also finds it necessary to import a few thousand tons annually at an annual average valuation in the 1956/61 period of $2 million. On a value basis, most tobacco imports have been flue-cured leaf from the United States. This tobacco is used in blending with domestic leaf in the manufacture of their top quality cigarette brands. In recent years these imports have been financed under P.L. 480.

No substantial change in the tobacco import pattern is anticipated over the period to 1975/76, especially if U.S. leaf tobacco continues to be made available to India on concessional terms. It is considered probable that domestic production will increase sufficiently to meet the expected rise in total consumption and also permit the country to maintain its export position — mostly of qualities and types that are substantially non-competitive with U.S. leaf in world markets.